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tained a sudden throw of the magnetometer-needle, denoting the magnetization of the iron, followed by a slower motion due probably to the heating effect of the light. While Mr. Bidwell does not consider the results as altogether free from suspicion until all possible disturbing causes have been eliminated, yet, if further research confirms the results already arrived at, the experiment is most important. The last year has added many proofs of the fact that light is an electro-magnetic disturbance, but none are so conclusive as this would be.

THE PURIFICATION OF SEWAGE.—Last year we described the plan proposed by Mr. W. Webster for the purification of sewage by electrolytic methods. It has been since tried on a large scale, and with encouraging results. The process is very simple, and is described by the *London Electrician* as follows: "The color, density, and constitution of the London sewage varies from hour to hour in the most extraordinary manner; but the first sample to be dealt with was of a light-yellow color, looking something like weak tea with a little milk in it, but, so far as could be seen, it contained very little solid matter in mechanical suspension. This having been poured into a test-jar, a current was passed through it between a pair of iron electrodes, with about six volts electromotive force. An extremely rapid effect was produced. In less than two minutes the jar was seen to be filled with a flocculent precipitate, which was gradually carried upward by the bubbles of liberated hydrogen. After about three minutes, the electrodes were withdrawn, and the precipitate left to collect at the top. In actual practice, after the effluent has passed into the settling-tank, the precipitate, in the course of about two hours, loses the whole of the entangled hydrogen; it then sinks to the bottom of the tank. The sludge thus formed is similar to that produced by the chemical processes now in use, except that the electrical method possesses the obvious advantage that the total quantity of material has not been increased by the addition of chemicals." But, besides this precipitation, there is an action on the organic matters in solution which robs them of their unpleasant and harmful properties. In the larger experiments carried on at Crossness, two 20-horse-power engines are used, with an Edison-Hopkinson dynamo. Iron plates are placed in the shoot through which the sewage is discharged. In travelling along the shoot, every particle of the sewage comes in contact with the plates, and finally the whole is received into the settling-tanks. With 27 horse-power, it is possible to treat a million gallons of sewage in twenty-four hours. The consumption of iron in actual working is about two grains per gallon. Taking a town with a daily flow of ten million gallons of sewage a day, — corresponding to a population of about 300,000, — the consumption of iron should not exceed 304 tons per annum, and the steam-plant required would be about 250. This plant takes the place of the mixing-tanks, machinery, and chemicals employed in the chemical process for the purification of sewage; and, if such electrical plant is designed to meet the peculiar requirements of the district, it should cost less than any other method, besides precipitating and purifying in one operation.

SECONDARY BATTERIES. — We are informed that in the United States Circuit Court, April 9, Judge Coxe approved of the disclaimer filed by the Electrical Accumulator Company, and formulated the decree and injunction restraining the Julien Electric Company, their officers, agents, and workmen, from further manufacture, use, or sale of secondary batteries of the Faure type, in which the active material is applied to the support in the form of a *paint, paste, or cement*.

NOTES AND NEWS.

THE "Atlantic Pilot Chart for April" says of whirlwinds, water-spouts, and tornadoes, that these phenomena are of the same general character; and it has been found, that, whenever they occur, it is in connection with a general cyclonic storm of large area. The principles involved in their formation are almost identical with those that determine the formation of a tropical cyclone; that is, great contrasts of temperature and moisture between adjacent layers of air. In the United States and off our coasts they may therefore naturally be expected to occur to the

southward of a storm-centre, where cold, dry northerly winds blow over and mingle with warm moist air from the southward. That they may occur to the north of a storm-centre, however, under certain conditions, is indicated by a report from Second Officer Madge, of the British steamship "Lake Winnipeg," Capt. Murray. This vessel encountered a severe cyclonic storm Feb. 27, latitude 40° 50' north, longitude 56° 48' west; and at 2.30 P.M., when it was blowing a strong gale from the east, a whirlwind was observed moving due west. The barometer was low, and the warm, moist east wind was evidently underrunning a cold, dry current of air from the area of high barometer to the northward, where readings of 30.4 inches and upward are reported. It will thus be seen that local conditions of pressure, temperature, and moisture may cause exceptions to the general rule.

— The lectures to the summer class in botany, of the College of Pharmacy of the City of New York, by Professor Joseph Schrenk, commenced Wednesday, April 10, and will be continued every Wednesday until the end of June. By request of several members of former botany classes, Professor Schrenk will also give a course in practical microscopy.

— The Essex Institute of Salem, Mass., was organized March 1, 1848, under a charter granted by the Legislature in February of that year, having for its objects the collection and preservation of whatever relates to the geography, antiquities, and civil and ecclesiastical history of Essex County; the formation of a cabinet of natural productions in general, and more particularly those of the county; the promoting a taste for the cultivation of choice fruits and flowers; its three departments then being history, natural history, and horticulture. The scope of the institute has been from time to time enlarged, and there are now departments of history, science, literature, art, and horticulture. The library of the institute, which in 1848 numbered fifteen hundred volumes, now numbers fifty-one thousand volumes, and embraces all the departments of literature, but is mostly useful for reference. A reading-room is the latest addition to the library department, and this is well supplied with historical, scientific, and art periodicals, besides the usual magazine literature of the day. The museum of the institute now contains a large and valuable collection of antiquarian and historical relics, portraits, paintings, engravings, medals, coins, paper currency, manuscripts, etc., and is in process of systematic arrangement. The scientific collections, which before 1867 had grown to be so large and of such value that it was impossible for the institute at that time to bear the expense of properly caring for and exhibiting them, were, by agreement entered into between the institute and the trustees of the Peabody Academy of Science in May, 1867, deposited with the last-named institution, where, properly labelled, arranged, and preserved, they are made available to the public, and form an attractive feature of the academy's museum at East India Marine Hall. The publications of the institute regularly issued are the *Historical Collections*, which have now reached Vol. XXV.; *The Bulletin*, which has reached Vol. XXI., and contains records of the regular meetings and field-meetings of the institute, and special papers on scientific subjects; the *Annual Report*; besides occasional monographs, etc. The rooms of the institute contain portraits of the officers of the Essex Historical and Essex County Natural History Societies, the forerunners of the institute; old prints; silhouettes; a great number of interesting relics; historical portraits by Copley, Smibert, Trumbull, and others; antique furniture; local relics; and military costumes. A fire-proof room holds the large and invaluable collection of manuscripts. The meetings of the institute are held on the first and third Mondays of every month. During the winter months, papers are read; and field-meetings are held throughout the county every summer for scientific and historical investigation and discussion. Without considerable endowments in the past, the institute has been able to do for the civil history and archaeology of Essex County — and no other county in America offers a better field for such research — what has been so well done for the natural history of the county, a cherished object of the institute, by the well-equipped and earnest workers of the Peabody Academy of Science. With largely increased facilities and resources, which it owes to the general appreciation of its work, it is now ready to go forward, as

the means shall come to hand, to a still larger measure of usefulness and honorable effort.

— From his recent experiments on explosive mixtures of petroleum vapor and air, Col. Majendie concludes, says *Engineering*, that one volume of liquid benzine will render 16,000 volumes of air inflammable, and 5,000 volumes violently explosive. Though these results show that great care is necessary in storing benzines and crude petroleums, other of his experiments are more re-assuring, as he has found that neither a glowing coal, sparks from a flint or steel, or a flameless fusee, will ignite the most explosive mixture of petroleum vapor and air, actual contact with a flame or white-hot body being necessary.

— On Wednesday, March 6, according to *Engineering*, while a number of torpedo-boats belonging to the French Government were manœuvring off the coast at Toulon, one of them turned turtle, and three of her crew were drowned. The weather at the time of the accident was fair, with a north-east wind blowing, and a swell from the south-east. During the day every thing had gone perfectly successfully till at about 4.30 in the afternoon the boats proceeded to pass out of the Bay of St. Nazaire, between the Embezi Island and the Grand Rouveau, on their way back to Toulon. Three of the boats effected the passage in safety; but the third, No. 102, was, when partly through, struck by a heavy roller and completely capsized. Her commander saved himself by clinging to the rudder, and others of the crew also succeeded in escaping; but three of the engineers and mechanics, being in the engine-room or the stokehold, were unable to get out, and were drowned. The boat floated for forty-five minutes, and finally sank by the stern. The screw, it is stated, continued to revolve for some time after the boat had turned upside down. The No. 102 was a 53-ton boat, 114 feet 9 inches long, and belonged to a type which has been much criticised, and of which the French Government own or have ordered fifty-one specimens, most of which, it is said, have not yet been delivered, which is fortunate for the authorities. The officers of the navy have made many complaints as to the unseaworthiness of these boats. Although this has been the first one that has actually capsized, such a catastrophe has hitherto only been avoided by the exercise of the greatest care on the part of their crews.

— The Paris Exhibition authorities have not yet decided upon the plan to be adopted as to jury examinations of exhibits, or as to reports and awards; nor indeed is it by any means settled whether there will be any juries, reports, or awards at all. One thing, indeed, seems quite certain, — that there will be no distribution of medals, the utmost that would be done being the possible giving of diplomas of different shades of merit. Upon the whole, the chances appear in favor of a total abandonment of the jury and award system, and in its place the substitution of an official document given to every exhibitor, certifying his presence at the exhibition. The object of such a certificate does not appear very clear. So far as England is concerned, the editors of *Engineering* believe that the general feeling of exhibitors will be against the granting of awards; and this for several reasons. At Manchester and Glasgow, the abandonment of the system, which has been gradually falling into disrepute, was favorably received by the exhibitors, who are always — excepting, of course, the recipients of medals and diplomas — opposed to juries' reports, which they regard as more or less superficial and prejudiced. More especially will this objection hold good in Paris, where the very small proportion of British jurymen will render it almost impossible for English exhibitors to obtain a fair proportion of recognition in the general struggle of each country's representatives. But if the decision be taken, and we think it will be a wise decision, to follow the example that has been set in England, and abandon all attempts to pronounce on the respective merits of exhibitors, the present exhibition offers a splendid opportunity for a new departure in official recompense. The idea has been, we believe, submitted to M. Berger by a member of the British committee, and is receiving due attention. It is that awards, in the form of medals or diplomas, should be given to those men whose names are famous in industry and science, and whose works have been so distinguished that the fruits they have borne appear in all parts of the exhibition, though the distinguished

workers themselves take no part in it. The number is limited, and the list would not be difficult to prepare, for the names of such men are familiar to all the world. Pasteur, Chevreuil, Dumas, Gramme, Eiffel, De Lesseps, Bessemer, Wylde, Swan, Armstrong, Edison, Bell, Alvan Clarke, are conspicuous examples of those whose labors have advanced civilization in all its branches. So, too, those societies all over the world, whose mission it has been successfully to promote industry and science, could be appropriately recognized; for, without their help and co-operation in the general cause of advancement, the Paris Exhibition of 1889 would have fallen miserably short of its present measure of success.

— *Bradstreet's* states that a company has been formed under the laws of New York State to develop large deposits of ozokerite, a natural paraffine wax existing in the Wasatch Mountains of Utah Territory, about 113 miles east of Salt Lake City. These mines are said to contain the only deposits of this mineral known to exist, outside of Galicia, in Austria, whence the entire world's supply of this product has until recently been obtained. The Austrian mines are said to yield a product inferior in quality to that discovered in Utah. The uses of this mineral are constantly enlarging, and in this country alone the consumption amounts to 500 tons yearly. The chief uses of the mineral in its crude state are in the manufacture of waxed paper, in the lining of wooden vessels, in varnish and blacking manufacture, and in the insulating of electrical wires. The American product is said to differ from the Austrian article in that it does not need refining, but comes direct from the mine ready to be melted and applied, while the Austrian product must be refined in order to be applied to its numerous uses. When refined, this mineral is used in the adulteration of beeswax and as a substitute for that article in candle-making, the manufacture of matches and dolls, and in the making of heavy lubricants. In its natural state it is found in veins varying from ten to twelve inches thick, and varies in color from a light yellow to brown and black. Baryslaw, in Galicia, a town of 12,000 inhabitants, is dependent entirely upon the mining of this product for its existence. The price of refined ozokerite, commercially known as "ceresin," ranges from 20 cents per pound for chemically pure white, down to 6 cents per pound for crude black of a poor quality. The company proposes to mine 1,500 tons of the wax yearly, and pay 7 per cent on a capital stock of \$1,250,000. The first shipment from the American mines arrived in New York in January this year, and attracted considerable comment.

— In its forecast of the weather for April on the Atlantic, the United States Hydrographic Office states that westerly winds, of less force, however, than during March, will prevail over the transatlantic steamship routes east of the 60th meridian: west of that meridian, and along the Atlantic coast of the United States, the winds will be variable. Gales may be expected about once a week north of the 32d parallel. But few northers will be felt on the Gulf, and those that do occur will be of less duration than earlier in the season. Icebergs and field-ice may be encountered between 40° and 50° west, and as far south as 41° north; fields may also be met with inshore as far west as the 65th meridian. Considerable fog will be experienced off the Grand Banks and the coast of the United States as far south as Hatteras. The north-east trades, having reached their southernmost point during March, will this month begin to extend farther north.

— The alleged resistance offered by American grape-vines to the ravages of the phylloxera has recommended those vines to wine-growers of Europe, where the pest has made its presence felt. Much uncertainty has existed among the growers as to the particular variety best adapted to resisting the insect ravages, and some disagreement has also been noted between those who favored grafting American cuttings on French vines and those who proposed to replace the French by the American article entirely by planting the latter in the place of the former. Dr. Geza Von Horvath, of the Hungarian experimental station, who has been studying the subject for seven years past, has published in detail the results of his experiments, recently referred to in *Bradstreet's*. There is but one American variety, and that the *Vitis rotundifolia*, or Scuppernong, that will successfully resist any and all attempts of the pest upon its roots. Unfortunately the European growers

will not plant this grape, owing to its, to them, unpalatable taste, and also to the fact that European vines will not graft well with it. All other varieties of American vines are more or less liable to infection. Many varieties are said to be as vulnerable to the pest as any European vine. Many varieties depend on differing soils and other conditions to render them free of the infection. The Concord grape is classed as one that offers resistance to the pest only under exceptional circumstances. Other varieties which are more or less liable to infection are the York, Madeira, Herbmont, Jaquez, Cunningham, Clinton, Taylor, Elvira, and Othello. All American varieties not covered by the above names, it is said, either do not withstand the phylloxera at all, or have not yet been sufficiently tested as to their ability to do so.

— The French Government has appointed an international congress on the subject of mines and metallurgy, to be held in Paris on the 2d of September in this year, in connection with the exposition which is to take place there during the next summer. The congress has for its object to make known and discuss the most recent inventions and improvements in mining and metallurgy, and will have brought before it a considerable number of memoirs which have been prepared by engineers specially detailed for the purpose. These reports will be printed and distributed in advance to persons who wish to become members of the congress, and will form the basis of the discussion; but other subjects may be introduced or other questions presented by the members, with the approbation of the officers in charge. The congress will consist of members and honorary members, the honorary members being appointed by the French Government, and the members becoming so upon the payment of twenty francs. Letters and communications from this country relating to the subject of mines and metallurgy may be addressed to Mr. Castel, inspector-general of mines, and president of the organizing commission, 144 Boulevard Raspail, Paris. The committee appointed by the French Government consists of, president, Mr. Castel (inspector-general of mines, president of the Society of Mineral Industry); vice-presidents, Mr. Brüll (past-president of the Society of Civil Engineers in Paris), Mr. Haton de la Goupillière (member of the institute, inspector-general of mines, director of the School of Mines of Paris), Mr. Jordan (professor of metallurgy at the Central School, past-president of the Society of Civil Engineers of Paris), and Mr. Rémaury (civil engineer of mines); secretaries, Mr. Dujardin-Beaumetz (secretary of the central committee of coal-mines), Mr. Gautier (civil engineer of mines), Mr. E. Gruner (civil engineer of mines), and Mr. Lodin (engineer of mines, professor of metallurgy at the School of Mines in Paris).

— It is said that John G. Borden of New York, who spends his winters in Florida, has offered a prize of \$1,000 to the Florida city which shall, on July 1, 1889, present the most cleanly appearance.

— Mr. Whitman Cross presents, in an article in the *American Journal of Science* for April, an account of a newly recognized tertiary formation, which, while of very limited geographical extent, yet possesses characteristics of importance in several directions. The points of interest brought out may be grouped as follows: 1. The formation in question occupies a portion of the area about the city of Denver, Col., hitherto assigned to the Laramie cretaceous; 2. The conglomerates and sandstones of the formation are chiefly made up of materials derived from a great variety of andesitic lavas, of whose outpouring and destruction alike there is no other record now known; 3. The celebrated fossil-plant beds of Table Mountain, at Golden, belong to the Denver formation, hence the taxonomic value which has been given to this rich flora must be considered subject to revision; 4. The vertebrate remains are of individual importance, and also present some very remarkable associations, which are apparently in direct conflict with all past observations.

— An electrical and industrial exhibition is to be held in Birmingham, England, during the months of August, September, and October. A very large amount of support has been promised for it, and there is every prospect that it will prove a success. The electrical department will be divided into three sections: the first including all kinds of machinery and apparatus for electric light-

ing; the second relating to complete displays of electric lighting on various systems; and the third comprising telegraphs, telephones, phonographs, electric bells and clocks, electric welding and smelting, electrotyping, telpherage, and miscellaneous apparatus. The industrial section will consist largely of Birmingham manufactures and manufacturing processes, although it will include many other subjects. The former will be specially interesting. The small trades of Birmingham form a *terra incognita* to the engineer, and an immense amount of ingenuity is exercised in producing the numberless small articles which are turned out from the capital of the Midlands.

— A "graphic" exhibition is to be held at Stuttgart next June, in celebration of the King's Jubilee. This exhibition is limited to firms or institutions of Wurtemberg. It will comprise the following sections: 1. All branches of the publishing business, such as books, musical works, and periodicals, as well as other auxiliary arts and processes, viz., engraving, lithography, chromolithography, xylography, zincography, photography, etc.; 2. Collections of kindred articles belonging to, or represented by, subjects of Wurtemberg; 3. Bookbinders' work, book tools and stamps; 4. Paper, and wares manufactured from the same; 5. Mechanical processes in operation, especially in the form of type-founding and accelerated printing-presses; 6. An historical display of ancient specimens of the graphic arts, as also of ancient Wurtemberg, artistic journals, illustrations, bindings, calligraphy, etc. The Royal Library at Stuttgart, which possesses one of the richest collections of Bibles, will alone provide a choice display of manuscript and printed books.

— Dr. J. H. Kidder of the Smithsonian Institution died April 8, at his residence in Washington, from an attack of pneumonia. Dr. Kidder served as a surgeon in the navy until he resigned, about twelve years ago. Since that time he has been connected with the scientific branch of the government service. Under Professor Baird, he was connected with the Fish Commission, and latterly he was director of the International Exchange, in the Smithsonian Institution. He leaves a wife, daughter of ex-Postmaster-General Maynard of Tennessee, and three children.

— At a meeting of the American Academy of Arts and Sciences, April 10, in Boston, the Rumford medals were presented to Professor Albert A. Michelson.

— The Société Botanique de France has decided to take advantage of the universal exposition to invite botanists who may be in Paris to a congress during the last half of the month of August, 1889. Those who take part in the congress can present papers on botanical subjects, pure or applied, with which they may be especially familiar. The society also intends to take advantage of the presence in Paris of a large number of prominent scientific men to bring forward for discussion a number of leading botanical questions. Among these will be the preparation of a botanical map similar to the geological maps prepared under the auspices of the Geological Congress and the aid which anatomy can furnish in classification.

— The unsightly efflorescence on walls, due to what is termed "saltpetring," and noticed generally in dry weather, is due, according to *Building News*, to several causes. Perhaps the only satisfactory explanation is that the newly built brick wall is exposed to dampness, or dampness in co-operation with something in the bricks themselves. It is stated that bricks made from clay containing iron pyrites are subject to this efflorescence; that the sulphur from the fuel converts the lime or magnesia into sulphates; and that whenever the bricks dry the sulphates evaporate, leaving behind the crystalline appearance or efflorescence. The evil is therefore due to the chemical action that takes place between the sulphur in the fuel and the magnesia in the clay. The mischievous part of the efflorescence is that it destroys the pointing, and injures the work generally. Remedies are few. The chief object is to stop up the pores with some solution of fatty matter, quicklime, and cement powder; but the main thing is to avoid the particular clay and coal fires employed to make and burn the bricks, and to mix the mortar with animal fat.